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BOARD OF PATENT APPEALS AND INTERFERENCES
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **OTTO, et al.**	§	**Group Art Unit: 1797**
Serial No.: 10/792,056	§	
Filed: March 3, 2004	§	**Examiner: Ellen M. McAvoy**
For: Method for Lubricating and/or Reducing Corrosion of Drilling Equipment	§	**Atty. Docket: 154-28553-US**

AMENDED BRIEF FOR APPELLANT

Commissioner for Patents
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REAL PARTY IN INTEREST

The real party in interest in this appeal is Baker Hughes Incorporated.

RELATED APPEALS AND INTERFERENCES

Appellant, its legal representative, and its assignee are unaware of any other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

STATUS OF CLAIMS

Claims 1-192 have been canceled. The appealed claims are new claims 193-221, which were finally rejected in the final action mailed December 4, 2008. A notice of appeal was filed by facsimile and received in the United States Patent Office on March 13, 2009.

STATUS OF AMENDMENTS

All amendments have been entered. Claims 1-192 have been canceled. The appealed claims are new claims 193-221, which appear in the Claims Appendix. New claims 193-221 have not been amended.

SUMMARY OF CLAIMED SUBJECT MATTER

The pending claims are directed to "a method of providing **extreme pressure lubrication** of drilling equipment during drilling operations." Claim 1 (emphasis added), Specification, ¶ [0001], ll. 5-7 (lubricants that are useful under "high temperature and/or high pressure conditions"); ¶¶ [0010]-[0013]; ¶ [0022]; and Examples ("extreme pressure" lubricants). The method comprises "providing a drilling fluid . . . comprising a **continuous phase** comprising as an integral component a dispersion comprising a quantity of ***insoluble* fatty acid soap particles comprising *alkali metal*.**" Specification, ¶¶ [0004], [0014]-[0015], and [0017]-[0020]. The method further comprises "drilling through a subterranean formation using the

PAGE 4/26 * RCVD AT 6/2/2009 12:56:03 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-5/18 * DNIS:2738300 * CSID:713 334 5157 * DURATION (mm-ss):06-04

drilling fluid system under conditions effective to . . .*react* **the insoluble fatty acid soap particles *with* one or more metal surfaces** of drilling equipment." See claim 193 (emphasis added); specification, ¶ ¶ [0012]-[0013]. The claims specify that the reaction produces a lubricating film which provides effective lubrication to metal surfaces subject to friction even under extreme pressure testing conditions. Specification, ¶ [0013] and Examples.

Claims 202-210 and 218-221 specify that the drilling fluid system comprises "polymers comprising acrylamide monomers." Specification, ¶ [0026]. Claims 202-210 also directly or indirectly specify "using the drilling fluid system under conditions effective to **maintain effective rheological properties** and gel strengths and to maintain effective fluid loss control properties." Claim 202 (emphasis added); specification ¶ [0025]; Examples..

Claims 197-201 and 211-221 specify that the alkali metal is lithium. Specification, ¶ [0017]; Examples. Claim 211 specifies that the insoluble fatty acid soap is lithium stearate. Specification, ¶ [0019]; Examples.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 193-221 are obvious under 35 U.S.C. § 103(a) over U. S. Patent No. 5,658,860 to Clark et al, alone, or in combination with U.S. Patent No. 6,403,537 to Chesser, et al.

2. Whether claims 202-210 and 218-221 are obvious under 35 U.S.C. § 103(a) over U. S. Patent No. 5,658,860 to Clark et al, alone, or in combination with U.S. Patent No. 6,403,537 to Chesser, et al.

3. Whether claims 197-201 and 211-221 are obvious under 35 U.S.C. § 103(a) over U. S. Patent No. 5,658,860 to Clark et al, alone, or in combination with U.S. Patent No. 6,403,537 to Chesser, et al.

ARGUMENT

I. Introduction

The claims are directed to a method of providing extreme pressure lubrication during drilling operations by providing the continuous phase of a drilling fluid with a dispersion

comprising a quantity of insoluble fatty acid soap particles comprising alkali metal. Alkali metals have a relatively **low valence**. "Previous [extreme pressure] lubricants, sometimes called boundary lubrication additives, generally used fatty acid soaps of metals having a relatively **high valence**, such as aluminum." Specification, ¶ [0010].

The specification explains that "[m]ost current drilling fluid systems comprise polymeric materials which tend to react with metals having valences greater than 1. The reaction between the polymeric material and a high valence metal in a fatty acid soap adversely affects drilling fluid properties." Specification, ¶ [0010].

The Declaration of Michael Otto (Exhibit A) explains that:

> During the early 1980's, I was working with a BHDF customer on location in the Imperial Valley of California. Otto Decl., ¶ 4. At least some of the wells drilled by the BHDF customer in the Imperial Valley were geothermal wells. Geothermal wells can have extremely high bottom hole temperatures (in excess of 500° F). Otto Decl., ¶ 5. The mud systems used by BHDF to drill geothermal wells in the Imperial Valley during the 1980's comprised high temperature acrylamide based copolymers. Otto Decl., ¶ 6.
>
> While drilling one geothermal well using a BHDF high temperature, copolymer mud system comprising acrylamide copolymer, the mud system was treated with a high temperature, extreme pressure lubricant called "LUBRI-FILM." Otto Decl., ¶ 7. LUBRI-FILM is an aluminum stearate/lignosulfonate dispersant. Otto Decl., ¶ 8. The mud system treated with LUBRI-FILM exhibited reduced torque and drag, but also exhibited an abnormal increase in mud viscosity. Otto Decl., ¶ 9. The abnormal increase in viscosity was believed to be partially due to a solids build up in the mud system. In order to resolve the solids build-up problem, a large portion of the mud system was displaced with new drilling fluid, producing conditioned mud. Otto Decl., ¶ 10.
>
> The conditioned mud was subjected to pilot testing on location at elevated temperatures to evaluate the effect of LUBRI-FILM on the conditioned mud. No abnormal viscosification was observed during the on site pilot testing. Otto Decl., ¶ 11. Based on the successful pilot test, a minimal treatment of approximately 1 ppb of the LUBRI-FILM was added to the mud system. Otto Decl., ¶ 12. **Within 48 hours after adding the 1 ppb of LUBRI-FILM to the mud system, routine product additions could not be made to the mud system due to the occurrence of abnormal viscosity/abnormal gel strength.** Otto Decl., ¶ 13 (emphasis added).
>
> All product additions to the mud system were stopped for a period of days to determine what, if any, products could be added to the conditioned fluid. Otto Decl., ¶ 14. A decision was made to stop using LUBRI-FILM in mud systems comprising acrylamide based polymers and copolymers. This decision was made even though the

operator and rig personnel were impressed with the performance of LUBRI-FILM and with its bluing effect on the drill pipe. Otto Decl., ¶ 15.

The need remained for an extreme pressure lubricant that could be used to treat high temperature mud systems comprising acrylamide based polymers and copolymers. Otto Decl., ¶ 16.

As seen from the following discussion, the examiner has not pointed to any teaching or suggestion in any reference of the claimed method of "providing **extreme pressure lubrication** of drilling equipment during drilling operations" comprising "providing a drilling fluid . . . comprising a **continuous phase** comprising as an integral component a dispersion comprising a quantity of ***insoluble*** **fatty acid soap particles comprising** ***alkali metal***" and:

> drilling through a subterranean formation using the drilling fluid system under conditions effective to **maintain effective rheological properties and gel strengths and** to maintain effective fluid loss control properties, and to ***react*** **the insoluble fatty acid soap particles** ***with*** one or more **metal surfaces** of drilling equipment in contact with the drilling fluid system, thereby producing lubricated drilling equipment comprising one or more metal surface comprising a substantially continuous lubricating film providing improved lubricity as reflected in **an increase in lubricating film strength compared to a control** ***during extreme pressure testing.***

Claims 193 (emphasis added). See also claims 197, 202 and 211.

The following discussion also reveals that the rejection disregards prior art that **teaches away** from the claimed method.

II. Friction Reduction vs. Extreme Pressure Lubrication

It is important to recognize that drilling equipment requires several different types of lubrication depending upon conditions during drilling operations. One type of lubrication (friction reduction) **reduces the coefficient of friction** at metal surfaces under relatively low pressures and loads. Friction reducers promote efficiency when drilling operations require moderate reductions in drag or torque. Friction reducers are evaluated in the laboratory using spindle speeds of about 60 rpm and pressures of about 150 in-lb or less. Friction reducers may be relatively low in viscosity, and are **not designed to react with the metal surface** of equipment to produce a coherent lubricating film.

Another type of lubrication, known as "extreme pressure" lubrication, **reduces the occurrence of metal-to-metal or metal-to-rock contact and seizure** at higher pressures and

loads. Extreme pressure lubricants are designed to **react with the metal surfaces** of drilling equipment to provide a coherent lubricating film effective to **reduce the occurrence of metal-to-metal or metal-on-rock contact and seizure** at higher pressures and loads.

This difference is made clearer by Exhibit B, a "Model 212 EP/Lubricity Tester Instruction Manual." Exhibit B demonstrates that there are **two different tests** for friction reduction and extreme pressure lubrication. A "Lubricity Test" measures the coefficient of friction for a given lubrication (friction reduction). A Lubricity Test is found in Section 4 of Exhibit B (p. 11-14).[1] An "Extreme Pressure (EP) Test" determines "the **load or pressure** the lubricant will hold without a complete ***breakdown*** **of film strength**. This is termed a *PASS*. A complete breakdown of film strength allows ***metal-to-metal contact***, which causes ***galling*** and is termed a ***SIEZURE.***" Exhibit B, p. 18 (emphasis added). An "Extreme Pressure (EP) Test" begins at p. 15 of Exhibit B.[2]

III. The Prior Art Teaches Away from the Claimed Method for Providing Extreme Pressure Lubrication

[1] In a Lubricity Test: the spindle speed is set at 60 rpm with an applied torque of 150 inch-pounds (16.95 N-m) pressure for 3 to 5 minutes. The torque reading is recorded. Nos. 2-4, Exhibit A, p. 14. The coefficient of friction is determined by dividing the recorded torque reading by 100. *Id.*, No. 1 under "Sample Lubricity Calculations."

[2] In the EP test: the spindle speed is set at 1000±100 RPM and the pressure is increased at a rate of 5 inch-pounds (.565 N·m) per second until the desired torque reading, or until a seizure occurs. To determine the lubricity film strength, the pressure on the test block at the time the test was stopped is divided by the scar area on the block.

$P = T/(1.5 \times L \times W)$

Where:
P = Film strength (PSI)
T = Torque meter reading (pounds)
W = Scar width (inches)
L= Scar Length (inches)

Id. The torque may be increased until a seizure occurs if the maximum lubricity film strength is to be determined. *Id.* The procedure can be repeated at reduced torque levels until a pass is achieved. *Id.*

Caution is required when running an EP test because, due to the extreme friction between the ring and the block, the fluid may reach the boiling point. The block and ring are specific to which test is being performed

A person of ordinary skill in the art at the time the invention was made (a "PHOSITA") would have been familiar with the teachings of U.S. Patent No. 3,047,494 to Browning ("Browning). Browning acknowledges that

> the prior art did not satisfactorily solve the problem of effectively providing E.P. [Extreme Pressure] lubrications for muds used under gulf coast drilling conditions. In particular, the E.P. lubricating muds prepared according to previously indicated formulations have not proved satisfactory for the more difficult and costly offshore or deephole drilling conditions.

Browning, col. 2, ll. 14-22. Browning explains that:

> Some existing materials such as sulfurized fatty acid compounds, esters, and the like, may be used to provide E.P. properties in essentially fresh water muds. These materials, however, lose their effectiveness when the pH exceeds 10.5 or thereabouts, will tolerate only about 10% oil, and begin to give erratic results when the calcium ion content of the mud filtrate exceeds about 80 p.p.m.

Browning, col. 2, ll. 23-29. *See also* U.S. Patent No. 3,048;538 to Rosenberg, col. 1, ll. 14-31, esp. ll. 30-31 (drilling fluids comprising alkali metal soap can be contaminated with calcium ions during use, resulting in **"curds of an insoluble calcium soap form[ing] and separat[ing] from the drilling mud . . . [that] seriously interferes with control of the mud system.")** Rosenberg, col. 1, ll. 30-33.

Browning reports that "for any E.P. additive to function effectively in any drilling mud, the additive must be present in the mud as a water insoluble colloidal or near colloidal dispersion. **Failure to provide E.P. lubrication protection occurred whenever an E.P. product of known effectiveness flocculated, coalesced or otherwise lost its stable dispersion characteristics.**" Browning, col. 2, ll. 41-67 (emphasis added).[3] Browning also reports that "oil insolubility of the E.P. additive was . . . a very important factor in preparing the E.P. additives for gulf coast drilling conditions. Such oil insoluble additives were found to include the metal soaps of fatty acids **other than the alkali metal soaps.**" Browning, col. 3, ll. 4-25. In particular, Browning suggests the use of aluminum stearate. *Id.*

[3] Rosenberg attempts to avoid the harmful effects of calcium ions on alkali metal fatty acid lubricating additives by incorporating dispersing agent(s) "in the drilling muds to disperse the insoluble calcium soaps and prevent their separation to interfere with drilling processes." Rosenberg, col. 1, ll. 69-71. Unfortunately, dispersing agents are likely to interfere with maintaining the insoluble colloidal or near colloidal dispersion which is required "for any E.P. additive to function effectively in any drilling mud." Browning, col. 2, ll. 41-42.

Browning teaches away from selecting alkali metal soaps as extreme pressure lubricants. This is strong evidence of non-obviousness. *In re Hedges*, 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986), quoting *W. L. Gore & Assoc. v. Garlock, Inc.*, 220 U.S.P.Q.303, 312 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

IV. THE EXAMINER HAS NOT MET HER BURDEN TO ESTABLISH THAT THE PENDING CLAIMS ARE OBVIOUS

The following discussion reveals that: (1) the examiner **has not met the flexible TSM test,** *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, 86 U.S.P.Q.2d 1196, 1201-02 (Fed. Cir. 2008)(emphasis added); (2) the examiner has not established that the claims are directed merely to "the **predictable use of prior art elements according to their established functions,**" *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 127 S.Ct. 1727, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007) (emphasis added); and, (3) the examiner has not established an **apparent reason to combine known elements** in the fashion claimed, *id.* (emphasis added).

A. CLAIMS 193-221

Claims 193-221 all specify a method of extreme pressure lubrication during drilling operations using a drilling fluid system comprising insoluble fatty acid soap particles comprising **alkali metal.** Claims 193-196 specify that the alkali metal is "selected from the group consisting of lithium, potassium, rubidium, cesium, and combinations thereof."

1. The Examiner has not Established that the Claims Are Directed Merely the Predictable Use of Prior Art Elements According to their Established Functions

The examiner has not even established that Clark teaches or suggests a method of extreme pressure lubrication. The examiner certainly has not established that the claims are directed merely to the predictable use of prior art elements according to their established functions.

a. The Clark patent

Clark describes a "well fluid emulsion having a water phase and an oil phase of a sulfurized alcohol and a naturally occurring fat, oil, or derivative thereof." Clark, abstract. Clark

explains that "the inventors have surprisingly discovered that an otherwise toxic sulfurized alcohol can be rendered non-toxic by solubilizing such sulfurized alcohol in an alcohol." Clark, col. 3, ll. 4-7.

Clark's fluid is "an oil-in-water emulsion well fluid, with oil or hydrophobic phase, and a water phase" wherein "the base fluid is water . . . . [and] the oil-phase of the oil-in-water well fluid . . . may include any non-water soluble material that will provide the required rate of penetration or lubrication . . . [including] **naturally occurring fats and oils.**" Clark, col. 4, ll. 45-58 (emphasis added). Clark describes a variety of suitable naturally occurring fats and oils that allegedly would be suitable for use **as the internal "oil phase" of** Clark's fluid:

> Where environmental concerns exist, it is preferred in the practice of the present invention that naturally occurring fats, oils, hydrocarbons, and derivatives thereof be utilized **as the oil phase component of the oil-in-water emulsion well fluid.** Preferably, the naturally occurring fats, oils, hydrocarbons, and derivatives thereof be utilized **as the oil phase** component of the oil-in-water emulsion well fluid are selected to be non-toxic and/or biodegradable.

Clark, col. 4, l. 63 - col. 5, l. 3 (emphasis added). Clark also states that:

> Derivatives of the above described fatty acids may also be utilized in the present invention. Such derivatives include **alkali**, alkaline earth, or transition **metal substituted fatty acids**; oxidized fatty acids; amides of fatty acids; salts of fatty acids; esters of fatty acids; sulfated fatty acids; sulfonated fatty acids; alkoxylated fatty acids; phosphatized fatty acids; and mixtures thereof.

Clark, col. 5, ll. 56-62 (emphasis added).

The examiner contends that the foregoing teaching in Clark renders the claimed method of extreme pressure lubrication obvious.

b. The examiner has not established that Clark teaches or suggests the claimed method of extreme <u>pressure lubrication</u>

The rejection should be reversed. The examiner has not established that Clark teaches, suggests, or otherwise would motivate a PHOSITA to perform the claimed method of extreme pressure lubrication.

The examiner certainly has not pointed to any teaching or suggestion in Clark of the claimed method of "providing **extreme pressure lubrication** of drilling equipment during drilling operations" comprising "providing a drilling fluid . . . comprising a **continuous phase**

comprising as an integral component a dispersion comprising a quantity of ***insoluble* fatty acid soap particles comprising *alkali metal*"** and:

> drilling through a subterranean formation using the drilling fluid system under conditions effective to **maintain effective rheological properties and gel strengths and** to maintain effective fluid loss control properties, and to ***react* the insoluble fatty acid soap particles *with*** one or more **metal surfaces** of drilling equipment in contact with the drilling fluid system, thereby producing lubricated drilling equipment comprising one or more metal surface comprising a substantially continuous lubricating film providing improved lubricity as reflected in **an increase in lubricating film strength compared to a control *during extreme pressure testing*.**

Claims 193 (emphasis added). See also claims 197, 202 and 211.

The examiner has not established that Clark describes "a finite number of known [materials] that predictably act as" extreme pressure lubricants. *Ex Parte Fu*, 89 U.S.P.Q.2d 1115, 1121 (Bd. Pat. App. & Int. 2008). The examiner has not established that PHOSITA would select **insoluble** alkali derivatives of naturally occurring fats and oils from among the many possible fatty acid derivative listed in Clark's for any particular purpose. In fact, based on the foregoing teachings of Clark, a PHOSITA would select ***liquid*** derivatives of Clark's "naturally occurring fats and oils" **for use *as Clark's "oil phase."*** The examiner also has not established that a PHOSITA would have been motivated to provide Clark's fluids with a "**continuous phase** comprising as an integral component a dispersion comprising a quantity of **insoluble** fatty acid soap particles comprising alkali metal." Claim 193. See also claims 197, 202, and 211.

The examiner certainly has not established that a PHOSITA would have a reasonable expectation that, if selected, the alkali metal derivatives of Clark's "naturally occurring fats and oils" would "***react . . . with* one or more metal surfaces** of drilling equipment" to produce a lubricating film which provides effective lubrication to metal surfaces subject to friction **even under extreme pressure testing conditions**. Specification, p. 3, ll. 20-p. 4, l. 1 (emphasis added). This conclusion is supported by Clark's Example 1, in which a low load, low pressure lubricity test is performed.[4] Clark's Examples do not reflect Extreme Pressure Testing.

2. The examiner has not established an apparent reason to combine the

[4]The rheostat is adjusted to "give 60 rpm with a load of 150 in-lb." Clark, col. 7, ll. 22-23. And, Clark gives the resulting "lubricity coefficient" for the various lubricants. Clark, col. 7, Table I.

references in the fashion claimed

The examiner cites "Chesser et al ['Chesser'] as teaching that drilling fluid systems conventionally contain acrylamide monomers." Final action, p. 2.

The examiner does not even attempt to establish that Chesser provides an **apparent reason to combine known elements** in the fashion claimed. *Id.* (emphasis added). The examiner does not point to a teaching or suggestion of a method of extreme pressure lubrication in Chesser. The examiner does not point to anything in Chesser that would motivate a PHOSITA to provide Clark's fluids with a "**continuous phase** comprising as an integral component a dispersion comprising a quantity of ***insoluble* fatty acid soap particles comprising *alkali metal*.**" Claim 193. The examiner certainly does not point to anything in Chesser that would give a PHOSITA a reasonable expectation that, if selected, alkali metal derivatives of Clark's naturally occurring fats and oils would "***react . . . with* one or more metal surfaces** of drilling equipment" and produce a lubricating film which provides effective lubrication to metal surfaces subject to friction **even under extreme pressure testing conditions.** Claim 193.

As seen from the foregoing, the examiner **has not met the flexible TSM test** with respect to claims 193-221. *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, 86 U.S.P.Q.2d at 1201-02 (emphasis added). The examiner has not established that claims 193-221 are directed merely to "the **predictable use of prior art elements according to their established functions,**" *KSR Int'l Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d at 1396 (emphasis added). Nor has the examiner established an **apparent reason to combine known elements** in the fashion of claims 193-221. *Id.* (emphasis added).

3. The Examiner has not Met Her Burden to Establish Inherency

Rather than pointing to a teaching, suggestion, motivation, or other initiative to combine known elements in the fashion claimed, the examiner contends that the limitations of the claims would be inherent in Clark if a PHOSITA selected alkali metal derivatives of Clark's naturally occurring fatty acids.

The rejection based on inherency should be reversed because the examiner has not met her burden to establish that "the missing descriptive matter is necessarily present in the thing described in [Clark and/or Chesser], and that it would be recognized by persons of ordinary

skill.'" [Citations omitted.] *In re Robertson*, 49 U.S.P.Q.2d 1949, 1951 (Fed. Cir. 1999). Inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *Id.*, citations omitted. "[A] retrospective view of inherency is not a substitute for some teaching or suggestion supporting an obviousness rejection." *In re Rijckaert*, 9 F.3d 1531, 1533-34, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1998).

Appellant respectfully requests the Board to reverse the rejection of all of claims 193-221 as obvious over Clark in view of Chesser.

B. CLAIMS 202-210 AND 218-221

Claim 202 specifies that the drilling fluid system comprises "one or more polymers comprising one or more monomers comprising acrylamide." The examiner contends that claims 202-210 and 218-221 are obvious over Clark in view of Chesser, which is said to teach "that drilling fluid systems conventionally contain acrylamide monomers." Final action mailed December 15, 2008, p. 2.

The Otto Decl. establishes that, in fluids containing such polymers, the prior art EP lubricant "LUBRI-FILM" created "an abnormal increase in mud viscosity." Otto Decl., ¶ 9. The examiner does not point to any teaching or suggestion in Clark or in Chesser of this viscosification problem. The examiner does not point to any teaching or suggestion in Clark or in Chesser that the viscosification problem could be solved by using insoluble fatty acid soap particles comprising alkali metal as an EP lubricant. The examiner does not point to any teaching or suggestion of a reasonable expectation that effective rheology and fluid loss control properties could be maintained in a drilling fluid system comprising both insoluble fatty acid soap particles comprising alkali metal and the claimed polymer.

For the foregoing additional reasons, the examiner **has not met the flexible TSM test** with respect to claims 202-210 and 218-221. *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, 86 U.S.P.Q.2d at 1201-02 (emphasis added). The examiner has not established that claim 202-210 and 218-221 are directed merely to "the **predictable use of prior art elements according to their established functions,**" *KSR Int'l Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d at 1396 (emphasis added). Nor has the examiner established an **apparent reason to combine known elements** in the fashion of claims 202-210 or 218-221. *Id.* (emphasis added).

Appellant respectfully requests the Board to reverse the rejection of claims 202-210 and 218-221 as obvious Clark in view of Chesser for these additional reasons.

C. CLAIMS 197-201 AND 211-221

Claim 197 specifies the use of a drilling fluid system comprising "insoluble lithium fatty acid soap particles." Claim 211 specifies the use of a drilling fluid system comprising "insoluble lithium stearate particles."

The examiner has not pointed to any teaching or suggestion in any reference of a method using "insoluble **lithium** fatty acid soap particles" in the continuous phase of a drilling fluid for any particular reason. The examiner certainly has not pointed to any teaching or suggestion specifically to use insoluble **lithium stearate** particles in the continuous phase of a drilling fluid in order to provide extreme pressure lubrication. Claims 211-221.

For these additional reasons, the examiner **has not met the flexible TSM test** with respect to claims 197-201 and 211-221. *Ortho-McNeil Pharmaceutical, Inc. v. Mylan Laboratories, Inc.*, 86 U.S.P.Q.2d at 1201-02 (emphasis added). The examiner has not established that claim 197-201 and 211-221 are directed merely to "the **predictable use of prior art elements according to their established functions,**" *KSR Int'l Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d at 1396 (emphasis added). Nor has the examiner established an **apparent reason to combine known elements** in the fashion of claims 197-201 or 211-221. *Id.* (emphasis added).

Appellant respectfully requests that the rejection of claims 197-201 and 211-221 be reversed for this additional reason.

IV. CONCLUSION

As seen from the foregoing:

1. Drilling equipment requires several different types of lubrication depending upon conditions during drilling operations.
2. One type of lubrication needed by drilling equipment, called friction reduction, reduces the coefficient of friction at metal surfaces under relatively low pressures and loads.
3. Friction reducers promote efficiency when drilling operations require moderate reductions in drag or torque, and are evaluated in the laboratory at spindle speeds of about 60 rpm and pressures of about 150 in-lb or less.
4. Friction reducers are not designed to react with the metal surface of equipment to produce a coherent lubricating film.

5. Another type of lubrication, known as "extreme pressure" lubrication, reduces the occurrence of metal-to-metal (or metal-on-rock) seizure at higher pressures and loads.

6. Extreme pressure lubricants are designed to react with the metal surfaces of drilling equipment to provide a coherent lubricating film effective to reduce the occurrence of metal-to-metal (or metal-on-rock) contact and seizure at higher pressures and loads.

7. There are two different tests for friction reduction and extreme pressure lubrication.

8. In the past, extreme pressure lubricants generally comprised fatty acid soaps of metals having a relatively high valence, such as aluminum.

9. Most current drilling fluid systems comprise polymeric materials which tend to react with metals having valences greater than 1.

10. Reaction between the polymeric material in a drilling fluid system and a high valence metal in a fatty acid soap adversely affects drilling fluid properties.

11. The examiner has not established that Clark teaches or suggests a method of extreme pressure lubrication.

12. Clark describes "an oil-in-water emulsion well fluid, with oil or hydrophobic phase, and a water phase" wherein "the base fluid is water . . . . [and] the oil-phase of the oil-in-water well fluid . . . may include any non-water soluble material that will provide the required rate of penetration or lubrication . . . [including] naturally occurring fats and oils." Clark, col. 4, ll. 45-58 (emphasis added).

13. Clark describes a variety of suitable naturally occurring fats and oils suitable for use as the internal "oil phase" in Clark's fluid.

14. Clark also states that:

> Derivatives of the above described fatty acids may also be utilized in the present invention. Such derivatives include alkali, alkaline earth, or transition metal substituted fatty acids; oxidized fatty acids; amides of fatty acids; salts of fatty acids; esters of fatty acids; sulfated fatty acids; sulfonated fatty acids; alkoxylated fatty acids; phosphatized fatty acids; and mixtures thereof.

Clark, col. 5, ll. 56-62 (emphasis added).

15. Based on the teachings of Clark, a PHOSITA would select liquid derivatives of Clark's naturally occurring fats and oils for use as Clark's oil phase.

16. The examiner has not established that a PHOSITA would have been motivated to provide Clark's fluids with a "continuous phase comprising as an integral component a dispersion

comprising a quantity of insoluble fatty acid soap particles comprising alkali metal." Claim 193. See also claims 197, 202, and 211.

17. The examiner has not established that PHOSITA would have a reasonable expectation that, if selected, the alkali metal derivatives of Clark's "naturally occurring fats and oils" would "react . . . with one or more metal surfaces of drilling equipment" to produce a lubricating film which provides effective lubrication to metal surfaces subject to friction even under extreme pressure testing conditions.

18. This conclusion is supported by Clark's Example 1, in which a low load, low pressure lubricity test is performed.

19. The examiner has not pointed to a teaching or suggestion in Clark or in Chesser of every limitation of the claimed method.

20. The examiner has not established that the missing descriptive matter is necessarily present in Clark and/or Chesser, and that it would be recognized by a PHOSITA.

21. The Otto Decl. establishes that, in fluids containing polymers comprising one or more monomers comprising acrylamide, the prior art EP lubricant "LUBRI-FILM" created "an abnormal increase in mud viscosity." Otto Decl., ¶ 9.

22. The examiner has not pointed to a teaching or suggestion in Clark or in Chesser to reduce an abnormal increase in mud viscosity by using EP lubricant comprising insoluble fatty acid soap particles comprising alkali metal.

23. The examiner has not established that a PHOSITA would have had a reasonable expectation that effective rheology and fluid loss control properties could be maintained in a drilling fluid system comprising polymers comprising one or more monomers comprising acrylamide and insoluble fatty acid soap particles comprising alkali metal.

24. The examiner has not pointed to a teaching or suggestion in Clark or in Chesser of a method using "insoluble lithium fatty acid soap particles" in the continuous phase of a drilling fluid for any particular reason. Claims 197-201.

25. The examiner has not pointed to any teaching or suggestion in Clark or in Chesser to use insoluble lithium stearate particles in the continuous phase of a drilling fluid for any particular reason. Claims 211-221.

26. U.S. Patent No. 3,047,494 to Browning ("Browning") would have taught a PHOSITA to use EP lubricants comprising metal soaps of fatty acids other than alkali metals.

For all of the foregoing reasons, Appellant respectfully requests that the rejection be REVERSED. The Commissioner is hereby authorized to charge any fees in connection with this paper, or to credit any overpayment, to Deposit Account No. 02-0429 (154-28553-US), maintained by Baker Hughes Incorporated

Respectfully submitted,

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BOARD OF PATENT APPEALS AND INTERFERENCES
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **OTTO, et al.**	§	**Group Art Unit: 1797**
Serial No.: 10/792,056	§	
Filed: March 3, 2004	§	**Examiner: Ellen M. McAvoy**
For: Method for Lubricating and/or Reducing Corrosion of Drilling Equipment	§	**Atty. Docket: 154-28553-US**

CLAIMS APPENDIX

1-192. Canceled.

193. A method of providing extreme pressure lubrication of drilling equipment during drilling operations, the method comprising:

providing a drilling fluid system having effective rheology and fluid loss control properties, the drilling fluid system comprising a continuous phase comprising as an integral component a dispersion comprising a quantity of insoluble fatty acid soap particles comprising alkali metal selected from the group consisting of lithium, potassium, rubidium, cesium, and combinations thereof; and,

drilling through a subterranean formation using the drilling fluid system under conditions effective to maintain effective rheological properties and gel strengths and to maintain effective fluid loss control properties, and to react the insoluble fatty acid soap particles with one or more metal surfaces of drilling equipment in contact with the drilling fluid system, thereby producing lubricated drilling equipment comprising one or more metal surface comprising a substantially continuous lubricating film providing improved lubricity as reflected in an increase in lubricating film strength compared to a control during extreme pressure testing.

194. The method of claim 193 wherein the improved lubricity comprises an increase of 25% or more in lubricating film strength, measured in psi, compared to a control during extreme pressure testing.

195. The method of claim 193 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 250 °F (121 °C).

196. The method of claim 193 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 450 °F (232 °C).

197. A method of providing extreme pressure lubrication of drilling equipment during drilling operations, the method comprising:

providing a drilling fluid system having effective rheology and fluid loss control properties, the drilling fluid system comprising a continuous phase comprising as an integral component a dispersion comprising a quantity of insoluble lithium fatty acid soap particles; and,

drilling through a subterranean formation using the drilling fluid system under conditions effective to maintain effective rheological properties and gel strengths and to maintain effective fluid loss control properties, and to react the insoluble lithium fatty acid soap particles with one or more metal surfaces of drilling equipment in contact with the drilling fluid system, thereby producing lubricated drilling equipment comprising one or more metal surface comprising a substantially continuous lubricating film providing improved lubricity as reflected in an increase in lubricating film strength compared to a control during extreme pressure testing.

198. The method of claim 197 wherein the improved lubricity comprises an increase of 25% or more in lubricating film strength, measured in psi, compared to a control during extreme pressure testing.

199. The method of claim 198 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 250 °F (121 °C).

200. The method of claim 198 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 450 °F (232 °C).

201. The method of claim 198 wherein the drilling fluid system comprises an aqueous continuous phase.

202. A method of providing extreme pressure lubrication of drilling equipment during drilling operations, the method comprising:

providing a drilling fluid system having effective rheology and fluid loss control properties, the drilling fluid system comprising one or more polymers comprising one or more monomers comprising acrylamide and a continuous phase comprising as an integral component a dispersion comprising a quantity of insoluble fatty acid soap particles comprising alkali metal selected from the group consisting of lithium, potassium, rubidium, cesium, and combinations thereof,

drilling through a subterranean formation using the drilling fluid system under conditions effective to maintain effective rheological properties and gel strengths and to maintain effective fluid loss control properties, and to react the insoluble fatty acid soap particles with one or more metal surfaces of drilling equipment in contact with the drilling fluid system, thereby producing lubricated drilling equipment comprising one or more metal surface comprising a substantially continuous lubricating film providing improved lubricity, as reflected in an increase in lubricating film strength compared to a control during extreme pressure testing.

203. The method of claim 202 wherein the improved lubricity is demonstrated by an increase of 25% or more in lubricating film strength, measured in psi, compared to a control during extreme pressure testing.

204. The method of claim 203 wherein the continuous phase is aqueous.

205. The method of claim 203 wherein the alkali metal is lithium.

206. The method of claim 204 wherein the alkali metal is lithium.

207. The method of claim 203 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 250 °F (121 °C).

208. The method of claim 203 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 450 °F (232 °C).

209. The method of claim 203 wherein the polymer comprises a combination of one or more acrylamide alkyl alkane sulfonate monomers and one or more dialkyl acrylamide monomers.

210. The method of claim 203 wherein the polymer comprises a combination of acrylamide methyl propane sulfonate (AMPS) and dimethyl acryamide (DMA).

211. A method of providing extreme pressure lubrication of drilling equipment during drilling operations, the method comprising:

providing a drilling fluid system having effective rheology and fluid loss control properties, the drilling fluid system comprising a continuous phase comprising a dispersion comprising a quantity of insoluble lithium stearate particles,

drilling through a subterranean formation using the drilling fluid system under conditions effective to maintain effective rheological properties and gel strengths and to maintain effective fluid loss control properties, and to react the insoluble lithium stearate particles with one or more metal surfaces of drilling equipment in contact with the drilling fluid system, thereby producing lubricated drilling equipment comprising one or more metal surface comprising a substantially continuous lubricating film providing improved lubricity as reflected in an increase in lubricating film strength compared to a control during extreme pressure testing.

212. The method of claim 211 wherein the improved lubricity is demonstrated by an increase of 25% or more in lubricating film strength, measured in psi, compared to a control during extreme pressure testing.

213. The method of claim 212 wherein the continuous phase is aqueous.

214. The method of claim 212 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 250 °F (121 °C).

215. The method of claim 212 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 450 °F (232 °C).

216. The method of claim 213 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 250 °F (121 °C).

217. The method of claim 213 wherein the dispersion remains thermally stable when the conditions comprise a temperature of 450 °F (232 °C).

218. The method of claim 212 further comprising providing the drilling fluid system with one or more polymers comprising acrylamide monomers while maintaining the effective rheological properties, gel strengths, and fluid loss control properties.

219. The method of claim 218 wherein the polymer comprises a combination of one or more acrylamide alkyl alkane sulfonate monomers and one or more dialkyl acrylamide monomers.

220. The method of claim 218 wherein the polymer comprises a combination of AMPS and DMA.

221. The method of claim 212 wherein the substantially continuous lubricating film reduces corrosion of the one or more metal surface.

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EVIDENCE APPENDIX

Exhibit A: Declaration of Michael Otto under 37 C.F.R. § 1.132.
Exhibit B: "Model 212 EP/Lubricity Tester Instruction Manual."

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RELATED PROCEEDINGS APPENDIX

None.